NATIONAL TRANSPORTATION SAFETY BOARD

Office of Railroad, Pipeline and Hazardous Materials Investigations

WASHINGTON, D. C. 20594

Southeastern Pennsylvania Transportation Authority

Train Collision

Upper Darby, Pennsylvania

Norristown High Speed Line

August 22, 2017

NTSB Accident Number: DCA17FR012

Operations Group Factual Report

Tomas Torres, Group Chairman

Operations Group Members:

Tomas Torres NTSB-Operations Group Chairman	George Good FTA Accident Investigator
Elizabeth Bonini PennDOT RTSRP	John Reynolds SEPTA Senior Director Transportation
Linda Angotta SEPTA Director Supervision	Jared Cassity SMART Investigator

Accident Summary

For a summary of the accident, refer to the *Accident Summary Report* in the docket for this investigation.

Events Prior to the Accident

Train 155 was a one-person operation. The Operator went on duty at 2:22 p.m. EST, August 21,2017, at 69th Street Transportation Center Upper Darby, Pennsylvania. This was the home terminal for the Operator, and had14 hours off-duty period prior to reporting for duty.

The assigned train consisted of one car (155) and was scheduled to travel on Route 100 starting at 69th Street Transportation Center to Norristown Transportation Center on the Norristown High Speed Line. The Operator performed a brake test and cab signal test prior to departing the yard and the initial trip. [1]

As the southbound train approached the accident area, the Operator was seated at the controls on the left side of Train 155.

In this area of the railroad there was tangent track approaching 2S signal with a declining grade, just past signal 2S there was a right-hand curve. Approaching signal 4S the grade was practically level. Just beyond the signal, there was a right-hand curve and at signal 6S there was a left-hand curve leading into the platform at 69th Street Transportation Center.

The railroad timetable direction of the train was south.

The Accident

[1] Refer at end of the report to Appendix A 921-NR3 Brake Test Procedures, and Appendix B 350-NR1 Cab Signal Testing Procedures for additional information at end of report.

The Operator had made eight round trips between 69th Street Transportation Center and Norristown Transportation Center. According to the mechanical data recorder, Train 155 departed Norristown at about 11:32:24 p.m. on the last return trip.[2]

At about 11:35:32 p.m. Train 155 entered a 30-mph cab signal segment of track at 50 mph. The master control was in P3, CSOS and CSAL became active. [3] At about 11:35:34 p.m. the Train continued to travel at 52 mph and the Operator moved the master control to B5, the CSOS remained active and CSAL became inactive.[4]

At about 11:39:51 p.m. Train 155 approached Gulph Mills Station at about 17 mph, and at approximately 264 feet from the Station, the Operator moved the master control momentarily to EMG.[5] The train came to a stop at 11:40:01 p.m., the Operator initiated a call to the Controller.[6]

When the Controller did not answer the call, the Operator then used his personal cell phone to establish communication. According to the Controller logs, the Operator established communications at about 11:41:08 p.m. The train Operator reported to the Controller "I slipped passed Gulph Mills, it's pretty slippery it's been raining a little bit". The Controller then authorized

[2] Refer to the Data recorder Factual report in the docket for additional information.

[3] Refer at the end of the report to Appendix C. SEPTA Operating Rule RDR 353 for additional information, The speed of the train / vehicle must be controlled so as not to achieve the overspeed condition, while at the same time avoiding unnecessary delay

[4] CAB SIG-Monitors the aspect of the cab signal presented to the vehicle Operator. CSOS- Monitors the cab signal overspeed indicator. CSAL-Monitors the cab signal overspeed circuit. MC-Master Control records the power, brake, EMG Fault positions.

[5] EMG- Refer to Appendix D- RDR-37 Use of Emergency Braking System.

[6] Train Dispatcher/ Controller- The person, located in the Control Center, who controls remote functions, monitors and oversees the line operation.

the Operator to make a reverse movement to Gulph Mills Station. Train 155 departed Gulph Mills station at about 11:43:19 p.m. and on continued south.

At 12:04:06 a.m. Train 155 entered a 30-mph cab signal segment at 51 mph in P3. At 12:04:07 a.m. the train speed was 52 mph, master control was in B6, CSOS and CSAL became active.

At 12:07:03 a.m. the train came to a stop at Township Line Road Station, and departed at 12:07:14 a.m.

Approach to 69th Street Transportation Center

Train 155 was traveling on main track two as it approached 69th Street Transportation Center. At 12:08:48 a.m. the Operator moved the master control to P3 and speed increased to 53mph as it entered the 30-mph cab mph signal segment of track. The mechanical data recorder data indicated a wheel slip indication, and CSOS and CSAL became active. As the train continued in the 30-mph cab signal segment the train speed increased to 54 mph. The Operator moved the master control to B6, the CSOS remained active and CSAL became inactive. The train continued to travel in the 30mph cab signal segment of track at 51 mph, at about 1795.5 feet from impact the master control was momentarily placed in EMG.

At about1425.6 feet from the impact, Train 155 entered a 15-mph cab signal segment of track at 48 mph, master control was in B7 and CSOS and CSAL became active. The train passed a stop signal indication (red) at 6S signal at 29 mph, the master control was in B7. As Train 155 continued to travel at 28 mph, the master control was momentarily in EMG and then back to B7.

According to the signal logs Train 155 encountered three wayside signals as it approached 69th Street Transportation Center, the first was a lunar aspect at 2S signal, the second was a lunar aspect at 4S signal, the third was a red aspect at 6S signal.

Lunar Aspect- (white lenses), Trains with operative cab signals proceed straight on main line route governed by cab signals. Trains without operative cab signals must stop and call Control Center for instructions.

Red Aspect- Stop and stay, call Control Center for instructions.

The Operator said that when the train passed by 6S signal he became aware of the impending collision, at which time he called out to the passengers "brace, brace, brace". Train 155 was traveling at 23 mph when the collision occurred. Train 155 struck the rear of standing Train 148 in track 1 and shoved it from berth A to berth B. The Operator landed on the floor between the operator's seat and the fare box.

The maximum authorized speed for Train 155 was 15 mph as it approached 69th St. Transportation Center as designated in the SEPTA Special Instructions.

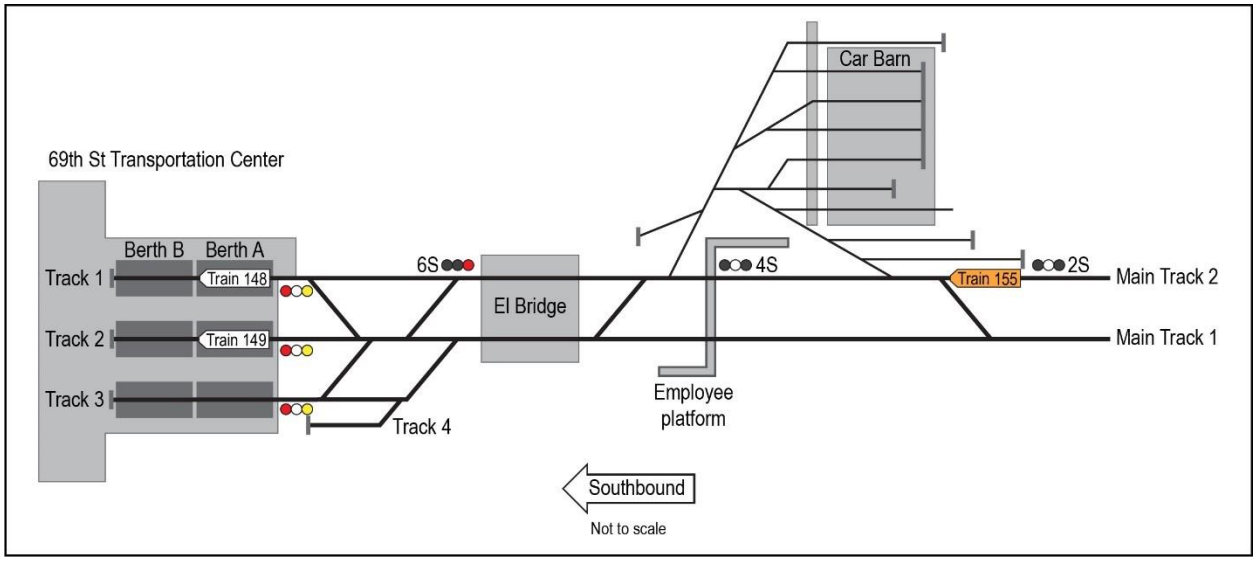

Figure 1 Diagram of 69th Street Transportation Center.

***508 Text**: diagram shows main track 1 and main track 2. Train 155 is traveling on track 2 from the right side of the diagram towards the left, which is southbound direction toward 69th transportation center. On the left of the diagram is 69th transportation center. 69th transportation center consists of tracks. They are labeled tracks 1, 2 and 3. Train 148 is stopped on track 1, train 149 is stopped on track 2. Track 3 is not occupied by a train.*

The interviews of the following were recorded and transcribed, they will be placed in the public docket.

Operator of Train 155. Transportation Manager, Controller, Chief Instructor, Operator of Train 148, Operator of Train 149.

Operator of Train 148

The Operator of Train 148 in track 1 was standing on the platform witnessed Train 155 approaching 69th St. Transportation Center, he said that he heard Train 155 sounding the horn in one continuously long blast but did not see the impact as his view was blocked by the Starter Booth. The witness said that he found the Operator of Train 155 on the floor between the operator's chair and the fare booth and unresponsive. The Operator of Train 148 established communications with the Controller and reported the accident and requested assistance from emergency personnel. The witness also stated, "when it's raining you can always expect the train to slide".[7] The Operator was asked by investigators if he had received training on how to handle the Train under slippery and sliding conditions. He said "yes, the training is to go to a lower brake to get the train, I guess, a chance to catch back up. And I think the train is designed to throw sand down while it does

[7] Refer to interview of Operator of Train 148 in the docket for additional information.

that."

Operator of Train 149

The Operator of Train 149 on track 2 was sitting in the cab said, "I heard a loud horn, and I looked and saw a train coming in, and it was coming kind of fast into 69th St Transportation Center". He said he witnessed Train 155 right before it got to 6S signal and he heard the horn being sounded like "in distress like get out of the way". He said he witnessed Train 155 strike Train 148 in track 1 that was in berth A and knocked it to berth B. He got out of Train 149 and made sure that the Operator of Train 155 was okay. The witness said the Operator of Train 155 was "knocked out behind the driver chair out cold. I just took his pulse to make sure he was still breathing". The witness said that he was instructed to depart on his Train 149 so as to clear the area so that the emergency personnel could have full access to the platform. The witness, when asked said that when it drizzles and after a rain the tracks can get slippery. He said that when he experiences slipping, he manipulates the master control from lower and higher braking setting along with applying sand on the rail to regain traction. [8]

Transportation Manager

A SEPTA Transportation Manager was dispatched to the scene. He happened to be in the immediate area. Once he got the notification from SETPA Operations Control Center he was at the accident scene within five minutes. The Transportation Manager stated that the SEPTA police and emergency personnel were already on scene, local police arrived shortly thereafter. He ascertained

[8] Refer to interview of Operator of Train 149 in the docket for additional information.

the condition of the train and track structure. The Transportation Manager discussed the situation with the two Train Operators that were at the platform and had witnessed the accident. He asked the Train Operators to write a statement as to what they had witnessed. The Operator of Train 149 in track 2 was released to proceed and depart 69th St Transportation Center, and

continued the trip to Norristown. During the interview the Transportation Manager was asked if he was familiar with the trains route. He said that in this incident, it had rained just prior and just from his experience over the years, "just after a rain, the rail tends to get slippery".

The Transportation Manager explained what a spin/ slide is. "Well, spin slide, it's just what we call it and that's actually what the annunciator label says on the Train, spin slide. The computer that runs the propulsion system can sense whether you're either spinning a wheel under acceleration or starting to slip under braking. While under power, it will reduce power to the wheels, to keep the wheels from spinning. While under braking, it will reduce the brakes to try to keep the wheel from locking up".

The Transportation Manager explained the computer that runs the propulsion system can sense either the wheels spinning under power while accelerating or while in braking. If slipping occurs while under power setting the computer will reduce power to the wheels. If the wheels are sliding under braking the computer will reduce braking to keep the brakes from locking up. The computer releases and re-applies the brakes at 70 percent what was previously requested. If a certain amount of time elapses without any further wheel slips the brakes will apply at 100 percent of what was requested. If the computer senses another wheel slip, it will reduce the braking effort

to 70 percent of the current braking. With every wheel slip, the braking effort will be progressively less.

The Transportation Manager was asked if SEPTA monitor's the Operators' performance. He said he conducts visual observations, and sometimes for speed limit requirements uses a radar gun. The Transportation Manager said he does not perform mechanical data recorder evaluations on the train Operators.[9]

Chief Instructor for suburban light rail

The Chief Instructor explained that prior to an employee being trained on the light rail, they must first be trained to be bus Operators.

The employees training for light rail consists of 20 days of training. Two days are dedicated to book of rules training. After the two days of rules training the employee will learn the characteristics of the territory and how to operate the Train that they will be operating on. The employee will first operate the Train without passengers for a minimum of 16 hours, and then will learn the route with passengers and on-board supervision from an instructor.

The Chief Instructor was asked about slipping and sliding conditions and if Operators are trained for such conditions. "Well, their driving -- their operating has to change, and it's not only that. It depends on the terrain, too. I mean it's raining and you're on a flat surface, is different than raining coming down a hill. It's operating according to conditions really".[10]

[9] Refer to interview of Transportation Manager in the docket for additional information.

[10] Refer at the end of the report to Appendix E - SETPA Operating Rule RDR-924 Safe Operation of Train/ Vehicle.

The Chief Instructor was asked what actions are taken by an Operator when they experience an overspeed, and if the train would experience a penalty brake application. The Chief Instructor explained that if there is an overspeed, the Operator will get a warning light on the Operator' control panel and will have 3 to 5 seconds to make a brake application to make the overspeed light turns off. If the Operator does not react in time, the Train will make a penalty brake application.

During the interview the Chief Instructor explained that the sling shot technique is when the Operator powers up to gain more speed as the Train is traveling from an area governed by a higher cab signal speed to a segment governed by a lower speed. The purpose of sling shot is to enter at a higher speed on a segment of track that is coded at a lower speed. "I know that code is going to drop. So, I'm going to get a little more speed before I get to that code drop and then I'm going to kind of go in a little faster than what I would normally go in. faster I'm still going to go -- when I get my no code, I'm still going to go brake 5, but I'm hitting it a little than normal". The Operator will power up before they get that cab signal drop in speed.

The Chief Instructor was asked to explain the Operators practice of 7 ½ braking. He said that to his knowledge, "it's almost bringing it to an emergency stop without dumping the vehicle.[11] That's my understanding of it. Maybe it's just to bring -- maybe it's an emergency where they didn't want to dump".

The Chief Instructor said that he was aware of the Operators practicing the sling shot, and the 7 ½ braking technique, but that it was not something that is taught during the Operators training.

[11] Dumping is in reference to the Operator initiating and emergency brake application.

The Chief Instructor explained train handling, brake application, and specific strategies related to inclement weather are not taught in the classroom but are taught during operation. Operators will not have experience in inclement weather if it does not happen during their instruction time.

Operating Documents

- Rail Operations Division Rules Manual 3rd Edition effective Sunday, November 6,2011.
- Rail Operations Division Authority Standard Rules 2nd Edition Effective Sunday November 21,2010.
- Victory District Special Instructions, Effective Sunday, November 6, 2011.
- Safety Rules for Rail Transportation Employees- Effective April 3, 2015.

Method of Operations

The Norristown High Speed Line is a two (2) track, 13 miles, 600 volts direct-current (VDC) electrically powered light rail line. The line operates regular light rail service between Norristown and Upper Darby Pennsylvania. The line operates frequent local and skip stop service to 22 light rail Stations between Norristown transportation center and 69th street transportation center, seven days a week. Norristown High Speed Line operated with Automatic Train Control System Rules- rail operations division rules applicable to the operation of trains/ vehicle in signal system territory where movements are governed by wayside signals, cab signals or both.[12] The NHSL N5 Trains and signal system are equipped with VETAG operation. Trains are automatically routed through a combination of information set at the Operator's console and wayside

[12] Automatic Train Control System (ATCS)-A system that provides for a penalty application of the brakes upon exceeding limitations relating to vehicle occupancy, position, spacing and speed. Cab Signal- A speed indicator on the vehicles can signal display unit that indicates the overspeed warning point. The Cab Signal is used in conjunction with interlocking signals with or in lieu of block signals.

communication equipment. Signal system rules RDR 204 and ATCS are in effect on No.1 and No.2 main tracks between 69th St. and Norristown transportation center.[13] Maximum authorized speed for the territory is 70 miles per hour. The speed from 69th St. Transportation Center mile post 0.0 to Northern limits of 69th St. interlocking at mile post 0.39 is 15 miles per hour. The direction was north and south.

[13] SEPTA Operating Rule-RDR-204. Tracks Signaled in Both Directions Main tracks equipped with signals for movements in both directions are designated in the Special Instructions. Signal indication will be the authority for train / vehicle movements in either direction on the same track.

Figure 2 Norristown High Speed Line Route

508 Text: *Diagram of SEPTA train route, on top of page it shows Norristown Transportation Center and at the bottom of the page it shows 69th Street Transportation Center with varies stations in between.*

Train 155

The Train was also equipped with a speed indicator, a mechanical data recorder and the following:

Operators Manual Norristown High Speed Line N-5 Cars

Cab Signal - A speed indicator located on the vehicle's cab signal display unit that indicates the overspeed warning point. The cab signal is used in conjunction with interlocking signals with or in lieu of block signals.

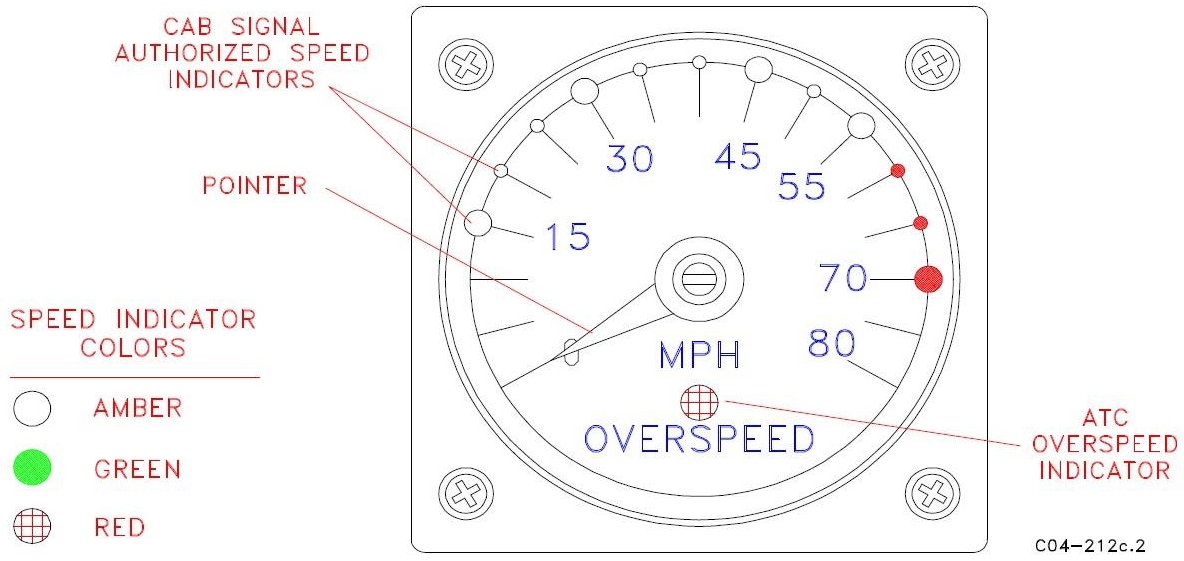

Figure 3 Speedometer/Cab Signal Display

508 Text: *diagram shows the speedometer, starts at 0 and goes in increments of 5 mph as speed increases. Cab signal authorized speed indicators are on each speed in increments of 5 mph. the ATC overspeed indicator in located on lower portion of the speedometer. To the left of the diagram are the speed indicators colors labeled amber, green, red.*

VETAG - An inductive system utilized by designated trolley vehicles which has the following functions: 1) operating electric switches on either a manual selective basis or automatic basis via transmitted ID, 2) set switches, 3) activating Station signs in the subway.

Train Brake Operation

There are seven braking positions (B1 - B7). Each provides a braking rate in accordance with Table 2-1.

Service braking is normally provided electrically (regenerative and dynamic braking) to a low speed, at which point the air brake (friction braking) is blended in to complete the stop. Just before a complete stop occurs, the computer momentarily reduces brake cylinder pressure to cushion the stop. Should dynamic braking be insufficient for any reason, the computer will automatically blend in additional friction braking to provide the requested brake rate.

A B5, B6, or B7 brake position must be used to acknowledge a Cab Signal/ATC overspeed condition. Wheel slide protection with automatic sanding is provided in all brake positions. If, due to slippery rail conditions, the spin/slide indicator turns on and the alarm sounds continuously, use a lower braking position. Because the ATC overspeed system requires at least a B5 brake application, poor rail conditions might cause wheel slide as soon as the application occurs. Therefore, when rail conditions are known to be very poor, make lower level brake applications in advance of known speed restrictions so that you will only need to use a B5 application for a short time, or not at all.

Normally the dynamic brake will provide braking requirements as called for by the master controller (little or no brake cylinder air pressure).[14] Friction braking will produce only brake rates B1 – B5 and emergency.[15] Emergency braking (EM) uses friction braking plus dynamic braking which provides 5.8 mphps. However, emergency dynamic braking may be decreased by moving the master controller to a lower brake setting. Minimum brake rate is 2.8 mphps, using friction only. **Emergency Braking**

A. Emergency braking is applied in any of the following circumstances:
    1. In the controlling cab, the controller handle is moved to the EM position.
    2. In any cab, the red EMERGENCY STOP pushbutton is pressed down.
    3. Whenever the emergency pipe pressure reduces below 90 psi.
    4. Whenever the main reservoir pressure drops below 90 psi. (Computer activates an emergency brake application). The emergency pipe pressure will remain at 100 psi.
    5. When all cars are in STORAGE and the computer shuts down.
    6. If the Trains should accidently uncouple.
B. Spin/slide protection with automatic sanding is provided in emergency braking.
C. When emergency braking is initiated, the operator can obtain a lower rate of deceleration by moving the controller handle to any service brake position (B7-B1).
    1. Use a braking position one level below that which causes a continuous spin/slide indication.

[14] Dynamic Brake: An electrical device that converts some of the energy developed by a moving locomotive into an effective retarding force.

[15] When friction brakes are applied calipers press brake pads against discs on the sides of the wheels.

2. Adjust for the best braking level that spin/slide conditions allow.

Note: If you have initiated emergency braking, you cannot recharge to release the brakes for 30 seconds and until the Train speed is below 5 mph.

In the event of computer failure, the master controller will retain direct control over the friction brake system. The emergency pipe pressure will rapidly reduce to zero psi when emergency braking has been initiated for any reason. The emergency pipe can only be recharged after the train has stopped, and the controller handle is moved to B5, B6, or B7 position with mode switch in RUN position.

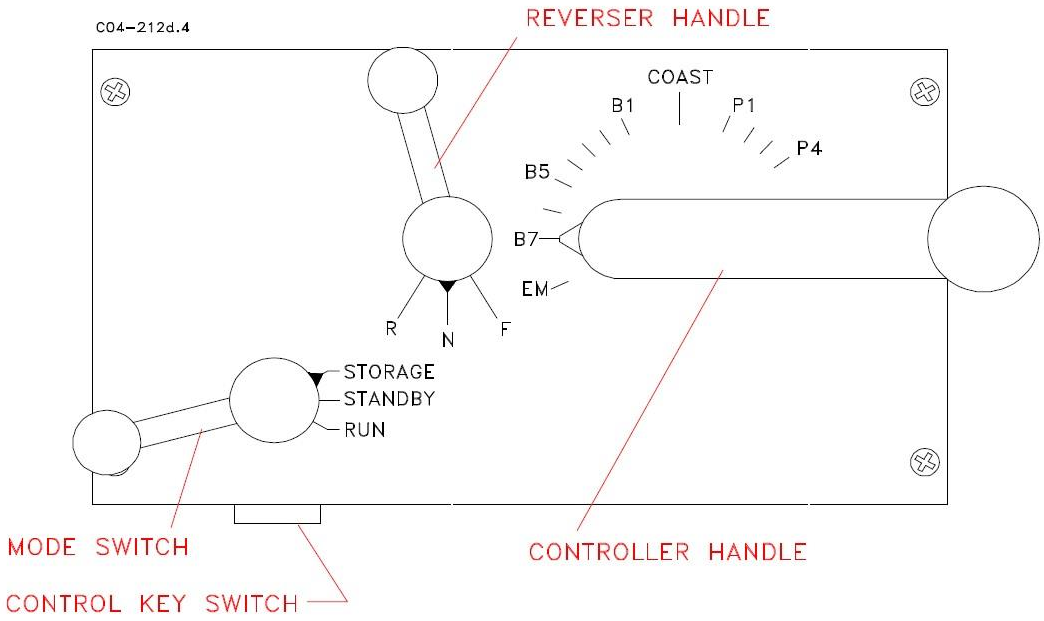

Figure 4 Diagram of Master Controller

508 text: *This is the diagram of Mater controller, to the lower left is a handle labeled mode switch with 3 positions labeled storage, standby, run. In the center of the diagram is the reverser handle with positions labeled R for reverse, N for natural, F for forward. On the right of the diagram is*

the controller handle. to the left of the handle it labeled EM for emergency, B7 through B1 , Coast. To the right of the handle it is labeled P1 through P4

Figure 5 Exemplar Operators control panel

508 Text: *This is photograph of the operators control panel. It has four gauges on the top panel, the left gauge is for the brake cylinder pressure, second to the left is brake pipe pressure, the center gauge is the speedometer, and the gauge to the right is the torque meter. Below the gauges and to the right of the panel are the mode switch handle, reverser handle, and the*

controller handle. There are various switches for lights horn, windshield wipers, intercom, doors , a red plunger labeled emergency stop.

Operator 8 Day Work History

Previous Time Off	Date / On Duty	On Duty Time	Date/ Off Duty	Time off Duty	Total Time on Duty
	08/14/17	2:22 p.m.	08/15/17	12:00 a.m.	9 hours, 38 minutes
17 hours, 28 minutes	08/15/17	5:28 p.m.	08/16/17	2:27 a.m.	9 hours, 19 minutes
11 hours, 37 minutes	08/16/17	2:24 p.m.	08/16/17	11:22 p.m.	9 hours, 58 minutes
19 hours, 38 minutes	08/17/17	7:00 p.m.	08/18/17	3:00 a.m.	8 hours, 0 minutes
	08/18/17	Rest Day/ Off			
	08/19/17	Off Sick			
24 hours plus	08/20/17	4:37 p.m.	08/21/17	12:21 a.m.	7 hours, 44 minutes
14 hours,	08/21/17	2:22 p.m.	08/22/17	12:09 a.m. approximate time of accident	Approx. 9 hours, 57 minutes

Operator Training

Hire Date	03/07/11
Suburban Light Rail Training Norristown High Speed	10/20/11
Equipment Certification	10/27/11
Last NHSL Certification	02/03/2016
Last Observation Ride- Pass	05/22/17
Last Rules Compliance Check-Pass	08/09/17

Southeastern Pennsylvania Transportation Authority Post Accident Actions

Immediately after the incident, the track speeds were reduced leaving West Overbrook Interlocking and approaching 69th Street Interlocking on the NHSL. On Sunday, August 27, those reductions were made permanent by re-coding the signal system.

Appendices

Appendix A

921-NR3 Brake Test Procedures a.N-5 Train - Yard

1.Enter the B-end cab and insert the key into the control key switch. Set the mode switch to **STANDBY**, and verify that the controller handle is in the **B7** position.

2. Turn on all interior lights and emergency evacuation light switches and activate sander switch. Activate the Headlight Bypass switch in the K41 cabinet and the Headlight switches on both consoles.

3. Verify the parking brake is applied (0 PSI) and the disc brake cylinder pressure is 35 PSI Perform a walk around inspection, making sure all cutout cocks are in the **NORMAL** position **(handle crosswise to the pipe)** and all lights are in working condition and sand has been dropped.

4. Make sure all switches to be used are set properly for your movement.

5. Turn Headlight Bypass switch off in K41 cabinet.

6. Once the main reservoir pressure exceeds 120 PSI, set the mode switch to Run and the reverser handle to Forward. To cancel the overspeed alarm, momentarily press the stop and proceed switch. Charge the emergency pipe by pressing the recharge rocker switch until the emergency pipe pressure reaches 110 PSI.

7. Make an emergency brake application by depressing the emergency stop button. Verify the emergency pipe pressure decreases to zero PSI and that the brake cylinder pressure increases to 50 PSI or more.

8. Place the emergency stop button in the UP position and after approximately 30 seconds recharge the system.

9. Make an emergency brake application by moving the controller handle to EM.

10. Verify that the emergency pipe pressure reduces to zero PSI and that the brake cylinder pressure increases to 50 PSI or more

11. Move the controller handle to B7 and after approximately 30 seconds recharge the emergency pipe.

12. Release the parking brake by momentarily pressing the parking brake release rocker switch and verify that the parking brake air pressure is 110 PSI.
13. Press the controller handle and move it to "Coast." Verify that the brake cylinder pressure Reduces to zero PSI.
14. With the controller handle in "Coast," release pressure on the controller handle to activate the deadman feature. Verify that a full service brake application occurs (35 PSI or more brake cylinder pressure) then place the handle in P1 and verify that there is no propulsion.
15. Reset the deadman feature by pressing down on
16. Perform a running brake test by placing the controller handle in P1 position to move the Train. Then make a service brake application to verify that the train stops properly.
17. Change ends and repeat steps 4 through 16.

b. N-5 Train - TERMINAL

3. Close the doors, make sure the parking brake is released, press the controller handle and move it to "Coast." Verify that the brake cylinder reduces to zero PSI and that the disc brake applied indicator turns off.
4. With the controller handle in "Coast" release the controller handler to activate the deadman feature. Verify that a full service brake application occurs (35 PSI or more brake cylinder pressure) then place the controller handle in P1 and verify that there is no propulsion.
5. Reset the deadman feature by pressing down on the controller handle and moving it to the B5, B6 or B7 position

Appendix B

350-NR3 Cab Signal Testing Procedures

Cab signals must be tested prior to leaving the yard and any other time the train's cab signal is turned off.

Test the Cab Signal/ATC system by placing the mode levers in "Run" and "Forward" and move the controller handle to the B4 position. Move the cab signal test switch to the "On" position to start the test sequence as follows:

a. Lamp Test - all speedometer/cab signal display lamps will light.

b. All cab signal speed codes up to 70 mph will be simulated in sequence (15, 30, 45, 55, and 70).

c. Overspeed codes from 70 mph will be simulated. Each time the red overspeed indicator light and alarm turn on, move the controller handle from the B4 position to the B5 position to acknowledge. When the overspeed red light goes out, move the controller handle back to B4 to continue the test.

d. An overspeed condition at zero mph will be the final test simulated. Do not acknowledge the overspeed alarm. This will result in an increase of 5 PSI on the penalty brake application. Stop and proceed button must be activated to acknowledge test.

e. When the cab signal test is completed (or to stop the test at any time) move the cab signal test switch to the **OFF** position.

Appendix C

RDR-353.Movement With Operative Automatic Train Control Apparatus

A. Speed Authorization

The speedometer/speed display unit indicates the speed at which an overspeed penalty will occur. The speed of the train / vehicle must be controlled so as not to achieve the overspeed condition, while at the same time avoiding unnecessary delay.

B. Operators must report any condition that prevents a train I vehicle from being operated at less than the maximum authorized speed. Overspeed Activation

In the event the train speed achieves any of the illuminated speed aspects, the overspeed light will illuminate and the audible alarm will sound. To avoid a penalty stop, the control handle must be placed in the appropriate brake position within the prescribed time. The audible overspeed alarm and overspeed light will deactivate when the Train Operator:

1.Responds within the required time, AND

2.Maintains application of the appropriate brake position until speed has been reduced below the maximum illuminated speed aspect.

C. Display of "No Code"

In the event the system conveys a "No Code", an audible alarm will sound and the overspeed light will illuminate when the train is moving; when the train is stopped, all Speedometer I Speed Display Unit lights will become dark. Upon receipt of a "No Code" the operator must:

1. Bring the train I vehicle to a complete stop,

AND

2. Unless otherwise specified by Special Instruction, contact the Train Dispatcher / Controller for instructions prior to moving the train / vehicle.

3. After permission has been granted to proceed, activate the “Stop / Proceed” button. The 15 MPH aspect will lash and an audible tone will sound. The movement must be made at Restricted Speed until receiving a more favorable speed display or passing a more favorable interlocking signal. Speed must not be increased until the train has run its entire length.

When communication cannot be immediately established, operators must activate the “Stop / Proceed” button and proceed at Restricted Speed. A report of the situation must be made to the Train Dispatcher / Controller as soon as possible without delay. Attempts to make this report must begin no later than the next Station after receipt of the “No Code.”

Appendix D

RDR-37. Use of Emergency Braking System

Train I vehicle emergency braking systems must only be used in emergency situations when necessary to prevent an accident, injury or damage. Once the

emergency brake system has been activated, the train / vehicle must come to a complete stop before attempting to recharge the system.

Appendix E

RDR-924. Safe Operation of Train / Vehicle Operators must be attentive and maintain a constant and vigilant lookout for anything that would affect the safe movement of their train or vehicle. If anything distracts the attention from a constant lookout ahead, or if weather or other conditions reduce visibility, operators must at once regulate their speed and operation to ensure safety.

A. Operator Responsibility for Safety

Operators are responsible for taking the following actions:

1. Making the safety of patrons and employees a priority over every other consideration.
2. Exercising good judgment, avoiding risks and complying with all rules and orders.
3. Ensuring all passengers boarding or leaving the vehicle are clear of the doors and the doors are closed before moving the train I vehicle.
4. Keeping aisles and passageways of vehicles clear of all baggage, to the extent practical. Baggage should be kept between seats and out of the aisles.

5. Keeping Careful watch for trespassers on the right-of-way, pedestrians, highway traffic and other obstacles in the foul of the track and exercise due diligence to avoid an accident or injury.
6. Notifying the controller of any trespasser or hazardous condition on the right-of-way.

Operators must monitor air pressure and other gauges and indicators while operating trains I vehicles. The Control Center must be immediately notified any time the gauges indicate abnormal conditions or any time the braking system is defective.

B. Adverse Weather Operations

Operators must adjust their operation during adverse weather and other unusual conditions to ensure safety, including but not limited to:

1. Adjusting their speed to maintain control of the vehicle when poor or limited visibility exists such as fog, heavy rain or snow.
2. Operating with extreme caution during slippery rail conditions caused by rain, sleet, petroleum or other slippery materials, chemical spray, leaves, snow or ice. Operators must consider

temperature and other weather related changes when operating trains I vehicle.

3. During periods of snow or ice accumulation, ensuring that all switch points are free of ice snow and that the points can be properly set for direction of travel. Upon inspection, operators may have to clear an obstruction in order to restore the switch to the normal operation. In such instances, the Control Center must be immediately notified. Operators must never place hands, feet or any other body part in switch points.

When the track area is flooded, Operators must stop their vehicles short of the flooded area, ensure it is safe before proceeding, and follow the proper procedures for operating through high water.

End of Report